Strategic Initiative 7 – Aquifer Restoration

Subproject Description

Fernald is located over the Great Miami Aquifer, one of the largest sources of drinking water in the nation. Following years of uranium metal production, the aquifer became contaminated with uranium. The levels of uranium in the groundwater are above the drinking water standard of 30 parts per billion set by U.S. EPA. Therefore, the Aquifer Restoration subproject will restore the contaminated portion of the aquifer, reducing the uranium concentration level to achieve the drinking water standard.

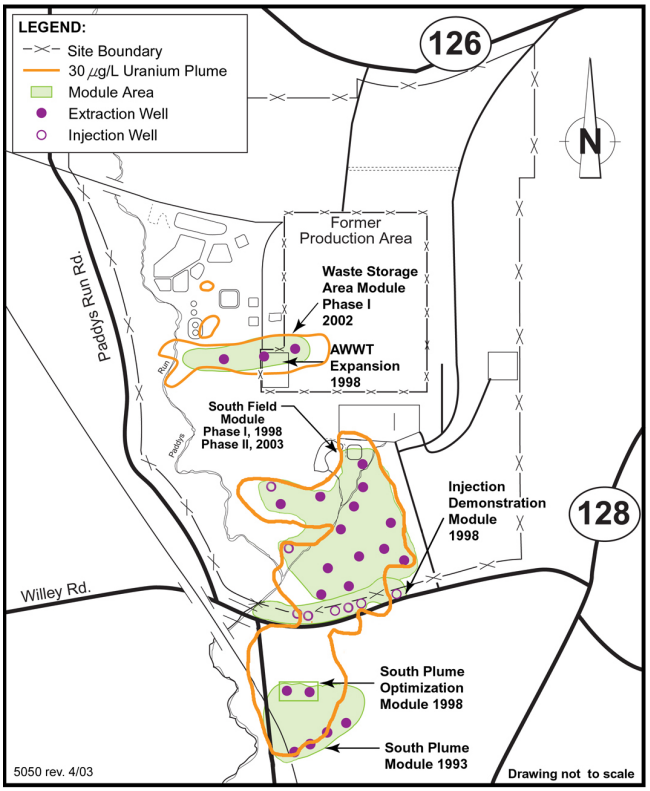
The Operable Unit 5 Record of Decision documents DOE's commitment to restore the Great Miami Aquifer within 27 years. This will be accomplished by pumping the contaminated groundwater from beneath 175 acres and treating it at the Advanced Wastewater Treatment Facility to meet a monthly average discharge limit to the Great Miami River of no greater than 30 parts per billion total uranium concentration.

Execution Strategy

In 1993, the first extraction wells were installed at the leading edge of the off-property South Plume as part of a removal action. The primary intent of this well system was to prevent further migration of the off-property portion of the groundwater plume. The groundwater uranium concentration in the area of these wells has already been reduced from more than 300 parts per billion to less than 150 parts per billion.

Fernald is undertaking a program to shorten the aquifer remediation timeframe. The effort to reduce the length of the remediation includes the use of accelerated pumping and re-injection technology, wherein some of the treated groundwater is injected back into the aquifer to help flush uranium contamination to the pumping wells. Although simple in concept, in order to work, the chemistry of the injected water must be in balance with that of the aquifer. Evaluation of this technology was sponsored by DOE's Office of Science and Technology Subsurface Contaminants Focus Area. Five re-injection wells were installed in 1998 and after a successful yearlong demonstration, it appears that re-injection is a viable enhancement for remediation of the Great Miami Aquifer.

AQUIFER RESTORATION MODULES AND WELL LOCATIONS



New Strategies to Achieve 2006 Closure

Completion of groundwater cleanup is part of the long-term stewardship of the Fernald site and is outside the definition of site closure. Consistent with the 2006 Execution Plan, the following activities are necessary for the Aquifer Restoration subproject:

- The groundwater restoration infrastructure to achieve final cleanup is to be in place by 2006
- Monitoring activities will be continued throughout the restoration process to confirm the effectiveness and progress of the remedy

In addition, the Fernald team was successful in gaining regulatory approval to revise the groundwater cleanup level for uranium from 20 to 30 parts per billion. This also enhances the accelerated cleanup schedule for groundwater.

The Advanced Wastewater Treatment Facility began operations in 1995 with a design capacity of 1,100 gallons per minute. Treatment involves the addition of polymers prior to flocculation and clarification steps, followed by multi-media filtration, carbon filtration of selected source streams, and finally ion exchange to remove the uranium. In 1998, the facility was expanded to a capacity of 2,900 gallons per minute. Also in 1998, a 10-well extraction system began operating in the South Field area and two more wells were added to the South Plume system.

Since then, additional extraction and reinjection wells have been installed as part of the South Field Phase II Module and three extraction wells were installed in the Pilot Plant Drainage Ditch Plume as part of the Waste Storage Area Phase I Module. The currently operating groundwater restoration system consists of 22 extraction wells, 7 reinjection wells, and a reinjection basin. In support of 2006 closure, the Aquifer Restoration subproject is monitoring groundwater cleanup progress and installing restoration infrastructure, as necessary, prior to site closure. As uranium concentrations reach the 30 parts per billion cleanup level, the individual wells will be turned off, resulting in a gradual decrease in total pounds of uranium extracted from the aquifer per year.

Approximately 80% of the treated groundwater processed through the Advanced Wastewater Treatment Facility expansion is being re-injected back into the aquifer, with the remainder discharged to the Great Miami River. The combined well extraction systems pump over a billion gallons of contaminated groundwater from the aquifer each year.

Current Subproject Status

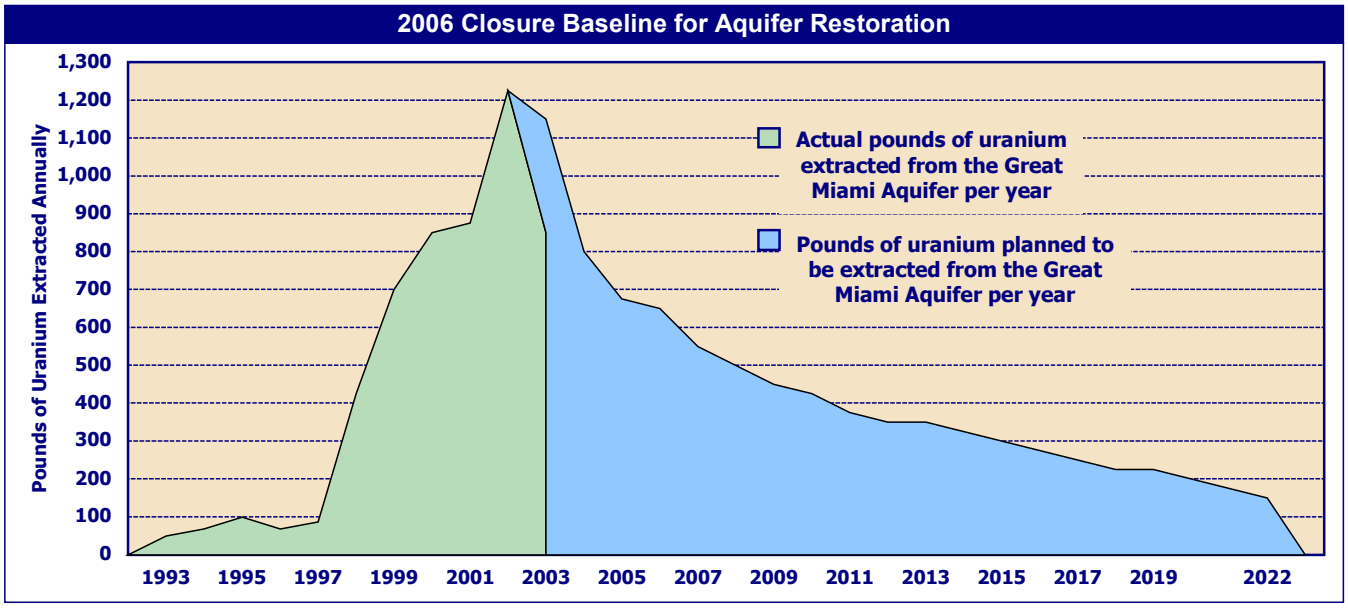
Subproject Status:

- Subproject is 41% complete
- 5,285 pounds of uranium have been removed from the Great Miami Aquifer
- Cost to Complete: $57 million to operate through June 30, 2006

The Aquifer Restoration subproject is 41% complete and has extracted more than 13 billion gallons of water from the aquifer since 1993, which has resulted in the removal of 5,285 pounds of uranium from the aquifer. Nine billion gallons of water have been treated. Although final certification of aquifer restoration is not within the definition of closure, it is expected that 60% of the uranium contamination plume will have been remediated at the end of 2006.

Key Actions and Responsibilities

The Aquifer Restoration subproject does not have any key actions or responsibilities necessary for acceleration. The ongoing actions to install needed infrastructure in accordance with the Fernald 2006 baseline will fulfill obligations for this subproject. Monitoring to assess the progress and effectiveness of the restoration program will continue.



Aquifer restoration extends beyond site closure. To date, 5,285 pounds of uranium have been removed from the Great Miami Aquifer.